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XXXIX. *Astronomical Observations made at Cavan, near Strabane, in the County of Donegal, Ireland, by Appointment of the Royal Society, by Mr. Charles Mafon.*

Read November 7, 1770.

Equal Altitudes of the Sun and Stars.

1769 April	Time per Clock of the equal Altitudes of the ☉'s limbs, and of *'s.	Zen. distance or points on the limb of the quadrant the nonius was set at.	☉'s Limb, and Stars observed.	Time per Clock when the ☉'s cent. and * passed the merid. from the mean of the Observations.
D — 3	h ' "			
	7 51 11½	1st wire	} 64 56	Arcturus
	54 45	middle wire		
	58 15—	3d or last wire		
	7 30 7	}	59 20	Ditto.
	33 41+			
	37 14—			
	9 20 14	}	72 40	Spica
	25 36			
	31 1½			
δ — 4	7 47 46	}	64 56	Arcturus
	51 19			
	54 49+			
	8 26 43	}		Ditto
	30 17½			
	33 49½			
	h ' "			
	9 16 49	2 41 59	} 72 40	Spica
	22 11			
	27 37+	31 11½		
	9 43 35+	2 15 10	} 70 15	Ditto
	49 49	8 56+		
	56 11	2 35		

11 59 23,3

Equal Altitudes of the Sun and Stars.

1769 April	Time per Clock of the equal Altitudes of the ☉'s limbs, and of *'s.		Zen. distance or points on the limb of the quadr. the nonius was set at.	☉'s Limb, and Stars observed.	Time per Clock when the ☉'s cent. and * passed the Merid. from the mean of the Observations.
8-5	h / '' 8 23 16½ 26 50 30 21½	h / '' } 2 38 30 33 7 27 41	o / 59 20	Arcturus.	
	9 13 23 18 47 24 11	2 38 30 33 7 27 41	72 40	Spica	
	9 40 8+ 46 23½ 52 44	2 11 44+ 5 30+ 1 59 9	70 15	Ditto	11 55 56,5
8-8	9 36 6½	middle wire	70 15	Spica	
8-10	9 11 30 Clouds 21 12½ 21 33 26 32½	2 18 16½ Clouds 8 33 2 8 13½ 3 14½	44 55 54 55	☉'s upp. limb ☉'s low. limb	11 44 33,5
	9 34 36 Clouds 45 31½	1 55 15 Clouds Clouds	52 35	☉'s upp. limb	
	51 38	1 38 7:	Ditto	☉'s low. limb.	
	8 6 9+ 9 44½ 13 16	} 1 54 35 Clouds 1 42 0	59 20 70 15	Arcturus Spica	11 38 49,0
8-12	7 59 18½ 8 2 53 6 25	} 59 20	59 20	Arcturus	

Equal Altitudes of the Sun and Stars.

April 1769	Time per Clock of the equal Altitude of the ☉'s Limbs, and of *'s.		Zen. distance or points on the limb of the quadr. the nonius was set at.	☉'s Limb, and Stars observed.	Time of Clock when the ☉'s cent. and * passed the merid. from the mean of the Observations.
	h / "	h / "	o /		
8—12	8 49 25+ 54 46 9 0 13—	Cloudy at the time corre- sponding	72 40	Spica	
24—20	7 47 1 50 50½ 54 33½	3 47 46 43 59 40 16—	62 36	☉'s upp. limb.	
	8 6 27½ 10 17½ 14 11	3 28 24 24 29 20 38½	60 00	Ditto	
	8 ^a 31 58½ 36 6 40 9— 44 32½	3 2 48½ 3 58 44 54 38½ 2 50 19	56 42	Ditto	
	7 35 23 38 56		59 20	☉'s lower limb Arcturus	
8—21	7 28 23 31 58+ 35 30		59 20	Arcturus	11 1 3,4
	7 7 59 31 8 4 22½	2 7 28:: 2 35 1 57 43½	75 5	Spica	
	8 18 28½ 23 52 29 18—	1 43 39— 1 38 16	72 40	Ditto	
12—22	8 45 48 49 48 53 44:		48 12	Arcturus	
	10 2 37 8 7— 13 44		39 25	Ditto	

Equal Altitudes of the Sun and Stars.

1769 April	Time per Clock of the equal Altitudes of the ☉'s limb, and of *'s.	Zen. distance of points on the limb of the quadr. the nonius was set at.	☉'s limb, and Stars observed.	Time per Clock when the ☉'s cent. and * passed the merid. from the mean of the Observations.																																																																																		
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N.B. This day I
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7 revolutions and
17 divisions (of
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time.

Equal Altitudes of the Sun and Stars.

1760 May	Time per Clock of the equal Altitude of the ☉'s limb, and of *'s.			Zen. distance of points on the limb of the quadr. the nonius was set at.	☉'s limb, and Stars observed.	Time per Clock when the ☉'s cent. and * passed the merid. from the mean of the Observations.							
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1	12												
	12	9	50 $\frac{1}{2}$	}	40	51	Arcturus						
	14	57											
2	12	4	26	}	40	51	Arcturus						
		9	28										
	14	32	:	}	39	5	Ditto						
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	33	57											
3	12	4	4	16	7	14	}	40	51	Arcturus			
		9	5 $\frac{1}{2}$	16	2	11+							
	14	11		15	57	5 $\frac{1}{2}$	}	39	5	Arcturus			
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6	12	2	55+	}	40	51	Arcturus						
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10	12	39	28 $\frac{1}{2}$	Cloudy at the time corre- sponding			39	5	Arcturus				
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24	1	2	58	6	54	38-	}	46	24	☉'s upp. limb			
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	11	4 $\frac{1}{2}$		Clouds									

14 5 38,9

14 1 12,0

14 0 5,0

Equal Altitudes of the Sun and Stars.

1766 May	Time per Clock of the equal Altitudes of the ☉'s limb, and of *'s.	Zen. distance of points on the limb of the quadr. the nonius was set at.	☉'s limb, and Stars observed.	Time per Clock when the ☉'s cent. and * passed the merid. from the mean of the Observations.																																																																																																								
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53	45																																																																																																											

Equal Altitudes of the Sun and Stars.

1769 June	Time per Clock of the equal Altitudes of the ☉'s limb, and of *'s.		Zen. distance of points on the limb of the quad. the nonius was set at.	☉'s limb, and Stars observed.	Time per Clock when the ☉'s cent. and * passed the merid. from the mean of the Observations.
24 — 1	h / "	h / "	o		
	1 6 31½		48 45	☉'s upp. limb	
	10 20				
	14 8 :			Ditto low. limb	
	18 5				
	21 12½	Cloudy at the time- correspond ing to these	46 48	☉'s upp. limb	
	25 9				
	29 2½			Ditto low. limb	
	33 10½				
	2 4 53½		41 23	☉'s up. limb	
	9 25				
	13 56—			Ditto low. limb	
	18 41				
	Cloudy with rain at night.				
25 — 2	23 28 24	9 35 41 ::	62 59	☉'s upp. limb	
	31 58½	32 6½			
	35 30	28 35			
	23 39 11	Clouds		☉'s low. limb	
	23 55 11	9 8 53	59 9	☉'s upp. limb	
	58 45+	5 17			
	0 2 16½	1 46			
	0 6 0	8 58 7½		☉'s low. limb	
	0 16 40 :	8 47 22½	56 5	☉'s upp. limb	
	20 15	43 45+			
	23 50	Clouds			
	27 33½	Clouds		☉'s low. limb	
	38 38½	Clouds	52 59	☉'s upp. limb	
	42 19	8 21 39			
	Clouds	8 18 5½		☉'s low. limb	
	49 44				

4 31 53.5

Equal Altitudes of the Sun and Stars.

1769 June	Time per Clock of the equal Altitudes of the ☉'s limb, and of *'s.	Zen. distance of points on the limb of the quadr. the nonius was set at.	☉'s limb, and Stars observed.	Time per Clock when the ☉'s cent. and * passed the merid. from the mean of the Observations.
2	h / '' 1 0 0	h / '' Cloudy	o / 49 45	☉'s upp. limb
	1st wirecloud. 1 5 48½	8 1 58½ 7 58 11		
	9 31	5 54 27		
	13 28			☉'s low. limb
	Clo. 1st wire 1 26 30		47 00	☉'s upp. limb
	30 25 ::			
	1 56 28		42 43	☉'s upp. limb
	Clouds	Cloudy at the times		
	2 17 56½	correspond-		
	22 37	ing to these	40 13	☉'s upp. limb
	27 18			☉'s low. limb
	32 17½			
	12 54 30 ::	The ☉'s last limb set.		
	Cloudy all night.			
	20 25	Cloudy with rain.		
3	o 16 47	8 54 43	56 30	☉'s upp. limb
	20 23	Clouds		
	23 57 :	8 47 35 ::		
	Then cloudy			
	o 31 27½	Clouds		
	35 6	Clouds	54 25	☉'s upp. limb
	38 40½	8 32 51 :		
	42 27	Clouds		☉'s low. limb
	o 46 50½	Clouds		
	Clouds	Clouds	52 16	☉'s upp. limb
	54 10	8 17 18½		

Equal Altitudes of the Sun and Stars.

1769 June	Time per Clock of the equal Altitudes of the ☉'s limb, and of *'s.	Zen. distance of points on the limb of the quadr. the merid. was set at.	☉'s limb, and Stars observed.	Time per Clock when the ☉'s cent. and * passed the merid. from the mean of the Observations.
h — 3	h ' " o 54 19 57 58½	Clouds Clouds	☉'s low. middle wire Ditto last wire	4 35 37,8
	1 4 43 8 28 12 11½ 16 5+		} 49 48 ☉'s upp. limb Low. limb last wire	
	1 22 2 Clouds Clouds	Clouds Clouds	} 47 28 ☉'s upp. limb	
	7 41 43 1 33 47	7 37 40	☉'s low. limb	
	Clouds Clouds	{ So hazy that I could not see the ☉'s limb at time correspon.	} 44 47 ☉'s upp. limb	
	1 50 46 55 00	7 16 25 :	☉'s low. limb	
	2 0 2 : Clouds Clouds	Clouds 7 9 7 2 54½	} 42 38 ☉'s upp. limb	
	3 1 00 6 55 13 4	Clouds 6 4 25 Clouds	} 36 9 ☉'s upp. limb	
	Then cloudy			

Though the air at external contact was not quite so clear as at some times I have seen, yet the sun's limb appeared well defined, and the spots in the disk very strong, their edges keen and distinct. At the internal contact, the air was much changed, and the limb of Venus seemed to cohere to the Sun's limb, by a protuberance that appeared like a dark shade: which seemed to prevent my seeing the thread of light for about 40" longer than I expected.

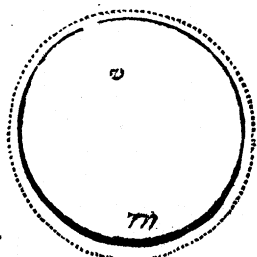
1769 June	Time per Clock of the equal Altitudes of the ☉'s limb, and of *'s.	Zen. distance of points of the limb of the quadr. the nonius was set at.	☉'s limb, and Stars observed.	Time per Clock when the ☉'s cent. and * passed the merid. from the mean of the Observations.
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h — 3

h ' ' | h ' ' | o ' |

Equal Altitudes of the Sun and Stars.

When the planet was upon the ☉'s disk, there appeared a faint light shade (having a gentle fluctuating motion) round its periphery, and widest on that part farthest on the Sun's disk: it appeared as per fig. the black circle representing the periphery of Venus, and the dotted one that of the shade, which was very regular and well defined; *v* the upper, and *m* the lower part of the planet: and the whole shade was apparently of equal brightness.



14 45 2½
48 38
52 13: }

38 17 α Lyræ

15 11 39+
15 16½
18 48+ }

34 28 Ditto

22 15 Cloudy with rain
40 Cloudy
49 28 The eclipse of the sun began
49 35 Very plain

52 Cloudy with rain:

23 28 The clouds began to break; and from this time to 23^h 54' I endeavoured with a micrometer (of Mr. Dollond's construction) to get measurements for determining the digits eclipsed; but was so interrupted by flying clouds, that nothing could be done with certainty; then cloudy with rain till the end of the eclipse was past.

☉ — 4 Cloudy

☿ — 5 14 44 19
47 51: :
51 23 }

38 17 α Lyræ

Equal Altitudes of the Sun and Stars.

1769 June	Time per Clock of the equal Altitudes of the ☉'s limb, and of *'s.		Zen. distance of points of the limb of the quad, the nonius was set at.	☉'s limb, and Stars observed.	Time per Clock when the ☉'s cent. and * passed the merid. from the mean of the Observations.	
	h	' "	h	' "	o	' "
☉ — 5	15	10 56 14 31½ 18 5	}		34	28 α Lyræ
☉ — 7	14	43 32½ 47 6 50 36	}		38	17 α Lyræ
☉ — 11	14	42 4 45 37+ 49 8	}		38	17 α Lyræ
☉ — 15	Wound up the clock					
☉ — 21	14	41 54 45 25	}		38	17 α Lyræ
☉ — 25	16	25 45 29 59 34 15	} Cloudy at the time corre- sponding to these	}	23	22 α Lyræ
☉ — 30	2	30 23 34 5 37 43½ 41 31 2 45 29 49 14 Clouds	Clouds Clouds 9 57 7 :: 9 49 24 9 45 38 Clouds	}	51	23 ☉'s upp. limb ☉'s low. limb 49 18 ☉'s upp. limb
	14	49 35½	☉'s last limb set			
	16	14 3 18 5	} Cloudy at the time	}	25	6 α Lyræ
	16	23 53 28 8 32 24	} correspon- ding	}	23	22 Ditto

6 17 28,9

Equal Altitudes of the Sun and Stars.

1769 July	Time per Clock of the equal Altitudes of the ☉'s limb, and of *'s.		Zen. distance or points of the limbs of the quad. the monius was set at.	☉'s limb, and Stars observed.	Time per Clock when the ☉'s cent. and *'s pas- sed the merid., from the mean of the Observations.
2 — 1	h ' "	h ' "	}	44 33	☉'s upp. limb
	3 25 22½ 3 29 22 Clouds	9 17 1 13 0 0 Clouds			
	30 40 17 Clouds 48 37	Clouds 8 57 51 Clouds	}	42 40	Ditto
	16 9 39½ Clouds Clouds	}			
2 — 3	16 8 53 12 54½ 16 55	} Cloudy at the time cor- responding.	}	25 6	* Lyræ
	22 45— 27 0— 31 14½				
			}	23 22	Ditto
24 — 6	2 12 20 15 56 19 29	11 7 21+ 3 44½ 0 13+	}	57 30	☉'s upp. limb
	23 10+	10 56 31½			☉'s low. limb
	26 51 30 29½ 34 3½	10 52 49+ 49 13 45 39+	}	55 26	☉'s upp. limb
	37 46	41 55½			☉'s low. limb
28 — 7	16 11 24 15 24	}		25 6	* Lyræ
	16 21 15— 25 29 29 45	}		23 22	Ditto

Equal Altitudes of the Sun and Stars.

1769 July	Time per Clock of the equal Altitudes of the ☉'s limb, and of *'s.	Zen. distance or points on the limb of the quadr. the nonius was set at.	☉'s limb, and Stars observed.	Time per Clock when the ☉'s cent. and *'s passed the merid. from the mean of the Observations.
	h / ' "	h / ' "	o /	
☉—16	Wound up the Clock			
☉—17	4 44 15 48 34 52 54 57 27½	Clouds 9 52 17— 47 59 43 24½	} 43 45	☉'s upp. limb
				☉'s low. limb
	5 1 56 6 32— Clouds	9 38 55 34 14 : Clouds	} 41 12	☉'s upp. limb
	5 16 8	9 24 42		☉'s low. limb
☉—21	16 2 4 6 6 10 6½	}	25 6	α Lyrae
	16 15 56½ 20 11 24 26½		}	23 22
☉—22	3 41 45½ 45 27 49 4 49 15 52 54½	11 35 12+ 31 32— 27 53 27 42 11 24 4		} 55 6
			☉'s low. limb middle wire Ditto 3 ^d or last wire	
	3 56 48½ 4 0 35 Clouds	11 20 9½ 16 25 12 42::	} 53 1	☉'s upp. limb
	4 16 47½ 4 20 47 24 37+	11 0 11½ 10 56 23½ 10 52 23		50 50
	16 1 42½ 5 43½ 9 44—	}	25 6	α Lyræ

Equal Altitudes of the Sun and Stars.

1769 July	Time per Clock of the equal Altitudes of the ☉'s limb, and of *'s.		Zen. distance or points on the limb of the quad. the nonius was set at.	☉'s limb, and Stars observed.	Time per Clock when the ☉'s cent. and *'s pas- sed the merid. from the mean of the Observations.
	h / "	h / "	• /		
1769 July	16 15 33½ 19 49— 24 4	}	23 22	α Lyræ	
1769 July	16 0 33 4 35½ 8 35½ 14 25 18 40 22 25	}	25 6 23 22	α Lyræ Ditto	
1769 July	15 59 4 16 3 3½:: 7 5	}	25 6	α Lyræ	
	Then cloudy				
August 1769	4 2 35+ 6 13½ 9 46+ 9 57 13 33	12 59 58½ 56 21 52 46+ 52 36 12 49 1	}	62 30 ☉'s upp. limb ☉'s low. limb Ditto	8 31 34.0
	4 18 36 22 17 25 54 29 42+	12 43 58+ Clouds 12 36 42 12 32 53	}	60 15 ☉'s upp. limb ☉'s low. limb	Very high winds
1769 August	Clouds Clouds 16 17 59	}	23 22	α Lyræ	
1769 August	16 17 15+	}	23 22	α Lyræ	

Equal Altitudes of the Sun and Stars.

1769 April	Time per Clock of the equal Altitudes of the ☉, limb, and of *'s.		Zen. distance or points on the limb of the quadr. the horiz. was set at.	☉'s Limb, and Stars observed.	Time per Clock when the ☉'s cent. and *'s pas- sed the merid. from the mean of the Observations.	
	h	m	s	h	m	s
8 — 9	17	25	24½	}	25 45	α Cygni
	29	00				
	32	32				
	37	43½		}	24 00	Ditto
	41	21				
	44	56				
8 — 16	17	22	49	}	25 45	α Cygni
	26	25				
	29	57				
	17	35	7½	}	24 00	Ditto
	38	44½				
	42	20+				
12 — 17	17	51	17	}	21 41	α Cygni
	54	58½				
	58	38				
	18	4	23	}	19 53	Ditto
	8	9½				
	11	55				
12 — 21	17	49	47	}	21 41	α Cygni
	53	28				
	57	8				
	18	2	52	}	19 53	Ditto
	6	39				
	10	24				
24 — 24	17	19	47½	}	25 45	α Cygni
	23	22½				
	26	25				
	Clouds			}	19 53	Ditto
	18	5	30			
	9	17½				

Equal Altitudes of the Sun and Stars.

1769 August	Time per Clock of the equal Altitudes of the ☉'s limb, and of *'s.	Zen. distance or points on the limb of the quad. the nonius was set at.	☉'s limb, and Stars observed.	Time per Clock when the ☉'s cent. and *'s pas- sed the merid. from the mean of the Observations.
☉—27	<div>h / "</div> <div>Clouds 17 22 15½ } Clouds</div> <div>Clouds 17 34 36 } 38 11—</div> <div>23 30</div>	<div>h / "</div> <div>Saw a Comet near</div>	<div>° /</div> <div>25 45 α Cygni</div> <div>24 00 Ditto</div>	
Sept. 2—1	Saw the aforementioned Comet through a thick haze; it was moved to the eastward.			
24—7	<div>Clouds Clouds 17 21 40 } 17 26 52 } Clouds } Rain in the 34 2½ } night</div>		<div>25 45 α Cygni</div> <div>24 00 Ditto</div>	
☉—10	Cloudy with rain till about half past 4 in the morning, when the clouds broke in the east, and I saw the Comet a little to the south of Procyon; its tail extended nearly to the belt of Orion, and made a splendid appearance. Cloudy and rain in 8' after.			
D—11	Wound up the clock			
2—15	<div>17 23 53+ 22 3 3+ } 27 32— 21 59 26— } 31 6 21 55 50½ } 17 40 25:: — — — } 44 8 21 42 50 } Clouds — — — } 19 54 59½ 21 31 58+ } 58 46— 21 28 10+ } 2 32—</div>		<div>24 00 α Lyrae</div> <div>21 41 Ditto</div> <div>19 41 Ditto</div>	19 43 28,5

Equal Altitudes of the Sun and Stars.

1769 Sept.	Time per Clock of the equal Altitudes of the ☉'s limb, and of *'s.		Zen. distance or points on the limb of the quad. the nonius was set at.	☉'s limb, and Stars observed.	Time per Clock when the ☉'s cent. and *'s pas- sed the merid. from the mean of the Observations.
	h / "	h / "	o / "		
D—18	17 22 46 26 24 + 29 59	}	24 00	α Cygni	
8—20	17 53 5½ 56 53½ 18 0 39	}	19 41	α Cygni	
	Clouds 18 9 37½ Clouds	}	18 00	Ditto	
24—21	8 10 33 15 20½ 20 9:	13 54 51 50 4½ 45 16	}	63 48	☉'s upp. limb
	20 26 25 21	44 59— 40 6½			☉'s low. limb Ditto
	8 32 44: 38 8 43 27	13 32 36 Clouds Clouds	}	61 30	☉'s upp. limb
	43 46 49 15	} Clouds			☉'s low. limb
	17 52 43 56 33½ 18 0 17½	}	}	19 41	α Cygni the * fluttered
	18 5 20½ 9 15½ 13 10	}	}	18 00	Ditto.
8—29	9 9 9 14 54 20 45	13 47 59 Cl.uds Clouds	}	63 24	☉'s upp. limb
	Clouds 18 6 15 19 10	} Cloudy at the time correspond- ing to these	}	18 00	α Cygni

Equal Altitudes of the Sun and Stars.

1769 Sept.	Time per Clock of the equal Altitudes of the ☉'s limb, and of *'s.			Zen. distance or points on the limb of the quadr. the nonius was set at.	☉'s limb, and Stars observed.	Time per Clock when the ☉'s cent. and *'s pas- sed the merid. from the mean of the Observations.				
	h	'	"	h	'	"	o	'		
8 — 29	8	15	24	Cloudy at the time cor- responding to these	16 50	Ditto				
	19	28								
	18	26	14½		15 00					
	30	39								
	35	3½								
	18	53	8	20 18 39	12 14					19 38 15.5
	57	52		Cloudy						
	19	4	1							
12 — 30	8	40	12	14 23 27½	66 55	☉'s upp. limb				
	45	10		18 34						
	50	5		13 37	Ditto					
	50	24		14 13 17½						
	55	27		8 16						
	9	3	34	14 0 8	64 35	☉'s upp. limb				11 32 14.4
	9	3		13 54 40						
	14	32		49 4						
	9	9	18	13 54 25		Ditto low. limb				
	14	55		13 48 43						
	20	41		43 2						
	18	19	7	20 56 39	16 50	α Cygni				
	18	25	52½	20 49 53+	15 00	Ditto				19 37 52.7
	30	14		45 30						
	34	41		41 5						
1 Oct 4	9	18	33	14 11 15½	65 50	☉'s upp. limb				
	24	12		13 59 58						
	29	53								
	24	29		59 32		☉'s low. limb				11 45 17.6
	30	16		53 37 ::						
	36	7								

Equal Altitudes of the Sun and Stars.

1769 October	Time per Clock of the equal Altitudes of the ☉'s Limbs, and of *'s.		Zen. distance or points on the limb of the quadt. the nonius was set at.	☉'s limb, and Stars observed.	Time per Clock when the ☉'s cent. and *'s pas- sed the merid. from the mean of the Observations.
	h "	h ' "	° ' "		
8 — 4	9 44 35	13 45 15	63 36	☉'s upp. limb	
24 — 5	18 24 1— 28 24 32 49	20 48 2 43 39 39 12	} 15 00	α Cygni	19 36 1,3
	18 49 52 55 39	20 22 10½ 20 16 25		} 12 14	
8 — 10	9 44 48 50 48 56 50	14 24 28: 14 18 30 Clouds	} 67 23		☉'s upp. limb
	9 51 5 57 16 10 3 33	} 14 5 42		}	☉'s lower limb
24 — 12	9 20 33 25 40 30 49		15 2 3 14 56 53 51 47		} 71 00
	25 55 31 10 36 26	14 56 36 51 25 46 8	}	Ditto low. limb	
10 — 23	9 23 7— 27 46 32 25	} Cloudy at the time cor- reiponding		} 68 16	☉'s upp. limb
	9 28 11 32 45 37 26½		15 59 39½		Ditto low. limb
	9 45 16 50 18 55 20	15 51 45 46 40 41 37½	} 75 54	☉'s upp. limb	12 48 52,1
	9 50 35 55 42 10 0 50	46 24 41 16 36 9		}	

Apparent Zenith Distances of the ☉, ♃, and *'s.

		☉, ♃, or *'s observed.	Apparent zen. distance on the meridian.	Barom.	Ther.
1769			° ' "		
April	10	Spica	64 45 24		
	20	☉'s upper limb	42 51 00	29 69	52
		Ditto lower limb	43 22 40		
	22	Spica	64 45 32		
		Arcturus	34 26 20		
		♃'s center	71 21 36		
		♃'s lower limb	77 30 36	29 52	42
		Antares	80 38 40		
	25	Spica	64 45 16	20 93	46
	26	Spica	64 46 6		
		Arcturus	34 27 00	29 85	52
	28	Arcturus	34 27 8	29 92	49
	29	Ditto	34 27 00	30 10	52
May	30	☉'s upper limb	39 37 40	29 97	60
		Ditto lower limb	40 9 16		
		Spica	64 46 00		
	1	☉'s upper limb	39 19 24	31 00	62
		Ditto lower limb	39 51 16		
	2	☉'s lower limb	39 33 26	30 20	59
	3	Spica	64 46 00		
		Arcturus	34 26 52	30 05	55
		Antares	80 39 12		
	4	☉'s upper limb	38 26 16	30 00	56
	6	Spica	64 45 50	30 12	48
		Arcturus	34 26 52		
	7	☉'s upper limb	37 36 00	29 94	59
		Ditto lower limb	38 7 56		
		Spica	64 45 50		
		Arcturus	34 26 48	29 87	47
		Jupiter's center	70 52 24		

Apparent Zenith Distances of the ☉, ☿, and ♀'s.

	☉, ☿, or ♀'s observed.	Apparent zen. distance on the meridian.	Barom.	Ther.	
1769		' ' "			
May 10	Spica	64 45 46			
	Arcturus	34 26 48	29 86	43	} In observing the ☉'s zen. dist. I set the ☉'s limb just (or scarcely) to touch the wire; which is the reason why the ☉'s diameter is in this observation so much greater then made before.
12	☉'s upper limb	36 17 16	29 60	54	
	Ditto lower limb	36 49 48			
	Spica	64 46 00			
13	☉'s upper limb	36 2 42	29 52	58	} Observed without the dark glass; it being a very thick fog.
	Ditto lower limb	36 34 30			
14	☉'s upper limb	35 48 28	29 55	57	
	Ditto lower limb	36 20 2	29 63	49	
	☿'s upper limb	55 50 56			
	Spica	64 45 55			
	Arcturus	34 26 52	29 69	44	
15	☿'s upper limb	60 54 40	29 69	44	
	Spica	64 46 00			
18	☉'s upper limb	34 53 40			
	Ditto lower limb	35 25 12	29 54	51	
	Spica	64 46 00			
	☿'s upper limb	73 30 32			
	☿'s cent.	70 30 20	29 64	37	
23	☉'s upper limb	33 53 00	29 22	59	
	Ditto lower limb	34 24 32			
	Arcturus	34 26 52	29 34	55	
24	☉'s upper limb	33 41 48	29 41	64	
	Ditto lower limb	34 13 38			
June 11	☉'s upper limb	31 25 40	29 41	53½	
12	Ditto	31 22 00	29 66	55	
	Arcturus	34 26 44			
14	☿'s upper limb	72 27 14	29 36	55	
15	☉'s upper limb	31 13 00	29 46	58	
17	Antares	80 39 12			
	☿'s upper limb	78 44 48	29 35	47	
18	☉'s upper limb	31 7 54	29 41	54	
	Ditto lower limb	31 39 42			

Apparent Zenith Distances of the ☉, ☽, and *'s.

		☉, ☽, or * observed.	Apparent zen. distance on the meridian.	Barom.	Ther.
1769			h ' "		
June	23	☉'s upper limb	31 7 20	29 17	60
		Ditto lower limb	31 39 12		
	26	☉'s upper limb	31 12 6	29 38	5
		Ditto lower limb	31 43 56		
	30	☉'s upper limb	31 24 6	29 71	60
July	1	☉'s upper limb	31 28 00	29 62	62
	5	☉'s upper limb	31 48 00	29 72	67
		Ditto lower limb	32 19 56		
	6	Antares	80 39 20	29 75	57
	9	☉'s upper limb	32 14 46	29 57	63
	13	☽'s upper limb	76 58 16	29 34	57
	14	☉'s upper limb	32 56 12	29 49	59
		☽'s upper limb	78 27 10	29 66	56
	17	☉'s upper limb	33 25 28	29 12	59
		Ditto lower limb	33 57 26		
August	22	Ditto	34 53 24	29 49	63
	2	☉'s upper limb	36 54 30	29 50	62
	17	☼ Aquilæ	46 33 12	29 69	54
		☽'s upper limb	61 39 20	29 70	51
	19	☉'s upper limb	41 56 20	29 40	57
		Ditto lower limb	42 27 56		

To find the Error of the Line of Collimation of the Quadrant.

1769
April
2-22

I set up a board at the distance of about 300 yards, painted black, with two white marks on it; the diameter of each white mark = $3\frac{1}{2}$ inches, and the distance of their centers $11\frac{1}{2}$ inches = the difference of the height of the center of the telescope, when the quadrant is inverted, and made the following observations.

Zen. dist. of the upp.mark.		
°	' "	
89	50 00	} The quadrant in its proper position.
50	6	
	4	
	6	
	0	
	4	
Mean	89 50 3	
Zen. dist. of the low.mark.		
°	' "	
90	7 20	} The quadrant inverted.
	7 20	
	18	
	14	
	16	
	20	
Mean	90 7 18,3	
	89 50 3	
	179 57 21,3	
	180 0 0	
	2 38,7	
$\frac{1}{2}$	1 19,3	To be added to the observed zenith distance.

26
28

I took the telescope off the quadrant, and adjusted the line of collimation something nearer. I found the error of the line of collimation of the quadr. in the same manner, as on the 22d, thus:

Zen. dist. of the upper mark.		
°	' "	
89	51 00	} Quadr. in its proper position.
	51 00	
	51 00	
	51 00	
	50 56	
	51 4	
	51 6	
	51 6	
	51 0	
Mean	89 51 2-	
Zen. dist. of the low.mark.		
°	' "	
90	7 20	} Quadrant inverted.
	7 12	
	24	
	20	
	22	
	20	
	18	
	16	
	18	
Mean	90 7 18,4	
	89 51 2-	
	179 58 20,1	
	180 00 00	
	2 39,9	
$\frac{1}{2}$	0 50	To be added to the observed zen. distance.

N.B. This method is given us by the Rev. Mr. Nevil Maskelyne, Astronomer Royal, in his description of Mr. Bird's astronomical quadr. published with his instructions for the observation of the late Transit of Venus, at the end of the Nautical Almanac of 1769, see p. 23, and may be followed with great accuracy; and to avoid the error that may fall on any two divisions of the quadr. as many different divisions may be taken as the observer pleases, by the shifting the board that has the marks on it, higher or lower.

For the Latitude of the Observatory at Cavan.

	☉ or *'s observed	App. zenith distances on the merid.	Refr.	☉'s px. in alt. hor. = 8",5	*'s ab. in decl.	*'s snut. in decl.	Error of the line of coll. of the quad.	True zen. distances.	☉ or *'s true decl. at the time of observation.	Latitude from each observation.
1769		o ' "	+	—	"	"	+	o ' "	o ' "	o ' "
April			"	"	"	"	"			
10	Spica	64 45 24	2 0,5	5,8	—7,6	—6,3		64 48 29,6	9 57 00,0	51 30
20	☉'s center	43 6 50	0 53,1					43 8 56,3	11 42 55,2	51 51
22	Spica	64 45 32	2 2,4		—7,5	—6,2	1. 19 +	64 48 39,7	9 57 00,5	51 39
22	Arcturus	34 26 20	0 39,7		—5,9	—5,8		34 28 7,0	20 23 33,8	51 41
	Antares	80 38 40	5 41,0		—2,0	—2,7		80 45 35,3	25 53 56,7	51 39
25	Spica	64 45 16:2	2 3,0		—7,5	—6,2		64 48 24,3	9 57 0,0	51 24:2
26	Spica	64 46 6	2 0,8		—7,5	—6,2	+	64 48 43,1	9 57 0,7	51 42
	Arcturus	34 27 0	0 39,1		—5,3	—5,8	"	34 28 18,0	20 23 33,6	51 52
28	Ditto	34 27 8	0 39,4		—4,8	—5,8	0 50	34 28 26,8	20 23 33,5	52 00:2
29	Ditto	34 27 0	0 39,4		—4,8	—5,8		34 28 18,8	20 23 33,5	51 52
30	☉'s center	39 53 28:0	0 47,2	5,4				39 54 59,8:14	56 48,5	51 48:2
	Spica	64 46 00	2 0,5		—7,4	—6,2		64 48 40,9	9 57 00,8	51 46
May										
1	☉'s center	39 35 20	0 47,9	5,4				39 36 52,5	15 14 57,2	51 50
2	☉'s L. L.	39 33 26	0 47,7	5,4				39 34 58,3	15 32 50,9	51 55
3	Spica	64 46 00	2 0,7		—7,2	—6,2		64 48 37,3	9 57 1,0	51 36
	Arcturus	34 26 52	0 39,0		—3,8	—5,7		34 28 11,5	20 23 33,4	51 45
	Antares	80 39 12	5 36,0		—2,6	—2,6		80 45 32,8	25 53 57,0	51 36
6	Spica	64 45 50	2 3,1		—7,0	—6,2		64 48 29,9	9 57 1,2	51 29
	Arcturus	34 26 52	0 39,9		—3,2	—5,7		34 28 13,0	20 23 33,2	51 46
7	☉'s center	37 51 58	0 43,5	5,2				37 53 26,3	16 58 21,2	51 48
	Spica	64 45 50	2 2,4		—7,0	—6,1		64 48 29,3	9 57 1,3	51 28
	Arcturus	34 26 48	0 39,7		—3,0	—5,7		34 28 9,0	20 23 33,1	51 42
10	Spica	64 45 46	2 3,5		—6,9	—6,1		64 48 26,5	9 57 1,5	51 25
	Arcturus	34 26 48	0 40,0		—2,3	—5,7		34 28 10,0	20 23 32,9	51 43
12	☉'s center	36 33 32	0 41,6	5,0				36 34 58,5	18 16 48,4	51 47
13	☉'s center	36 18 36	0 48,0	5,0				36 20 1,8	18 31 36,0	51 38
14	☉'s center	36 4 15	0 40,2	5,0				35 5 40,2	18 46 4,5	51 45
	Spica	64 45 55	2 2,5		—6,5	—6,1		64 48 34,9	9 57 1,7	51 33
	Arcturus	34 26 52	0 39,6		—1,5	—5,7		34 28 14,4	20 23 32,7	51 47
18	☉'s center	35 9 26	0 39,8	4,9				35 10 50,9	19 40 46,0	51 37
	Spica	64 46 00	2 4,4		—6,1	—6,1		64 48 42,2	9 57 2,0	51 40
23	☉'s center	34 8 46	0 36,9	4,8				34 10 8,1	20 41 36,8	51 45
	Arcturus	34 26 52	0 38,2		±0,2	—5,6		34 28 14,8	20 23 32,2	51 47
24	☉'s center	33 57 43	0 36,5	4,7				33 59 4,8	20 52 44,3	51 49
June	☉'s U. L.	31 25 40	0 34,0	4,4				31 26 59,6	23 8 38,7	51 26
15	☉'s U. L.	31 13 00	0 33,4	4,4				31 14 19,0	23 21 23,6	51 30

For the Latitude of the Observatory at Cavan.

	☉ or *'s observed	Ap. zenith distances on the merid.	Refra.	☉'s px. in alt. hor. = 8",5	*'s ab. in decl.	*'s snut. in decl.	Error of the line of colli. of the quad.	True zen. distances.	☉ or *'s true decl. at the time of observation.	Latitude from each observation.
1769		° ' "	° ' "	—	"	"	+	° ' "	° ' "	° ' "
June	17 Antares	80 39 12	5 34,8	—	—3,9	—2,4	0 50	80 45 30,5	25 53 58,1	51 32
	18 ☉'s center	31 23 48	0 33,9	4,4				31 25 7,5	23 26 37,1	51 45
	23 ☉'s center	31 23 16	0 33,2	4,4				31 24 34,8	23 27 5,6	51 40
	26 ☉'s center	31 28 1	0 33,6	4,4				31 29 20,2	23 22 25,0	51 45
	30 ☉'s U. L.	31 24 6	0 33,8	4,4				31 25 25,4	23 10 26,0	51 38
July	1 ☉'s U. L.	31 28 0	0 33,5	4,4				31 29 19,1	23 6 24,6	51 31
	5 ☉'s center	32 3 58	0 33,7	4,5				32 5 17,2	22 46 20,6	51 38
	6 Antares	80 39 20	5 31,1		—3,8	—2,3		80 45 35,0	25 53 58,6	51 36
	9 ☉'s U. L.	32 14 46	0 34,3	4,5				32 16 5,8	22 19 50,6	51 43
	14 ☉'s U. L.	32 56 12	0 36,0	4,6				32 57 33,4	21 38 17,3	51 38
	17 ☉'s center	33 41 27	0 36,2	4,7				33 42 48,5	21 8 52,0	51 41
	22 ☉'s L. L.	34 53 24	0 38,4	4,8				34 54 47,6	20 12 42,8	51 42
August	2 ☉'s U. L.	36 54 30	0 41,4	5,1				36 55 56,3	17 40 4,4	51 50
	17 α Aquilæ	46 33 12	0 59,5		+7,8	+3,9		46 35 13,2	8 16 25,9	54 51 39
Mean of the whole										51 40,8

N. B. By comparing Mr. Flamstead's observations with those made by the Rev. Mr. Maskelyne, Astronomer Royal, in the years 1765 and 1766, Arcturus moves annually 2",0144 Southward in declination: therefore 18",6 is subtracted in the above from the declination of Arcturus, as settled from Dr. Bradley's observations for the beginning of the year 1760.

The following are the difference of R. A. between the γ 's limb and \ast 's, observed by wires placed in the focus of the eye glaſs of a reflecting telescope, that magnified 80 times. The telescope was supported by a polar axis placed in the meridian, and on a strong ſtand, loaded with weight, which made it keep its poſition very ſteady.

1769 July		Time per Clock.	Difference of R. A. between the γ 's limbs and \ast 's.	
γ	\ast	\ast passed the vertical wires in the reflector.	γ 's 2d or Eastern limb, passed the ſame vert. wires	
		h / "	h / "	
19	39	33	- - -	
	39	43	19	43 32 $\frac{1}{2}$
	47	13	51	13
	47	24 $\frac{1}{2}$	51	25
	47	36	51	38
20	5	11	20	9 35 $\frac{3}{4}$
	5	21 $\frac{1}{2}$		9 48
	5	34		10 00
	18	13 $\frac{1}{2}$	22	57 $\frac{1}{2}$
	18	25	23	9
	18	36		20 +
	18	48		32
20	19	00 ::		44 $\frac{1}{2}$
20	25	17 +	30	12
		28		33 $\frac{3}{4}$
		39 +		35
		51		46
	26	3	30	59
	33	54	39	2
	34	5	39	13
	34	40	39	48
	41	37	46	6
	41	48 $\frac{1}{2}$	47	7 $\frac{1}{2}$
Clouds			47	19
Cl.				30 $\frac{1}{2}$
20	42	23 $\frac{1}{2}$	47	42 $\frac{1}{2}$

After theſe, it got ſo hazy that I could not ſee the ſtar.

N. B. The \ast paſſed along the wire parallel to the equator, or moved in a line parallel to the ſaid wire. At the laſt obſervations the \ast was about 18 or 20' north of the γ 's center.

Difference

Difference of Right Ascension between the γ 's Limb and \ast 's.

Time per Clock.			Time per Clock.		
July ♀ — 21	γ 's 1st limb passed the wires vertical to the equator.	\ast 's 1st limb passed the wires, same vertical	July ♀ — 21	\ast 's 2nd limb wires vertical to the equator.	γ 's 2nd limb passed the same wires.
	h / "	h / "		h / "	h / "
18	30 3 $\frac{1}{2}$	18 33 53—	21	51 4	21 53 27 $\frac{1}{2}$
	30 15+	34 3		51 15 $\frac{1}{2}$	53 39+
	39 41+	42 13 $\frac{1}{2}$		51 26	53 50
	39 32	- - -		51 37 $\frac{1}{2}$	54 2
	40 4	42 36—		51 49 $\frac{1}{2}$	54 14
	40 15+	- - -	21	58 39	22 1 14+
	40 27—	42 59		58 50	- - -
18	53 39 $\frac{1}{2}$	18 55 47		59 1	1 36
19	5 7	19 6 58		59 12+	1 48
	18	7 10—		59 24	2 00
	29 $\frac{1}{2}$	7 20+	22	5 50 $\frac{1}{2}$	8 36
	41 $\frac{1}{2}$	7 32		6 1 $\frac{1}{2}$	8 46
	5 53 $\frac{1}{2}$	7 43+		6 12	- - -
	10 47	12 27 $\frac{1}{2}$		6 24	9 10
	10 59	12 38 $\frac{1}{2}$		6 36—	9 21
	11 10+	12 49 $\frac{1}{2}$	13	9	16 18
	11 21 $\frac{1}{2}$	13 1		13 20	16 29 $\frac{1}{2}$
	11 34—	13 12 $\frac{1}{2}$		13 31	16 41—
19	17 00	- - -		13 42	16 53
	12—	18 42—	18	14	21 19+
	23	18 52 $\frac{1}{2}$		18 25	21 30 $\frac{1}{2}$
	35+	19 4		18 36—	21 41 $\frac{1}{2}$
	17 47	19 16		18 47	21 53
	22 42	- - -	22	18 59	22 5+
	22 53 $\frac{1}{2}$	19 24 14		28 12 $\frac{1}{2}$	31 32—
	23 4 $\frac{1}{2}$	- - -		28 23+	31 43+
	23 16	24 36 $\frac{1}{2}$		28 34 $\frac{1}{2}$	31 54 $\frac{1}{2}$
	23 28+	24 48		28 46	32 5
	30 18	- - -		28 57+	32 18
	30 30 $\frac{1}{2}$	31 40	37	11	40 43—
	30 42—	31 50		37 22+	40 54 $\frac{1}{2}$
	30 53 $\frac{1}{2}$	32 1		37 33+	41 4 $\frac{1}{2}$
	31 5 $\frac{1}{2}$	32 14		37 44 $\frac{1}{2}$	41 17
			22	37 56 $\frac{1}{2}$	41 29

N.B. In all these observations the \ast moved parallel to the equator.
At the beginning of the observations the \ast was North of the γ 's center about 18'.

At 19h.47' when I left off to take the occultation, the \ast was but little North of the γ 's center; by estimation 3 or 4'.

The differences of A.R. after the occultation are very accurate, the γ being near the meridian, leaving the \ast nearly in a right line from her center.

Immediately after these, it began to get foggy.

Difference

Difference of Right Ascension between the γ 's Limb and \ast 's.

Time per clock.	
July 21	γ 's 2d limb passed the wires vertical to the equator. \ast passed the same vertical wires.
19 33 33½	19 34 38
33 45+	34 49
33 56+	35 0½
34 8	35 12—
34 20+	35 24—
41 5+	- - -
41 16½	42 9
41 28	42 20½
41 40—	42 32—
41 52	42 43+
46 11	46 56½
19 46 23+	19 47 8

Left off to take the occultation.

Time per clock.	
1769 August 16	γ 's 1st limb passed the wires vertical to the equator. A star of the 5th mag. passed the same vert. wires.
h ' "	h ' "
18 4 30—	- - -
4 43—	- - -
4 55	18 25 1+
5 6	25 12—
5 18—	25 23

Cloudy immediately after.

A bright spot in the γ moved along the directing wire, or wire parallel to the equator, and the \ast followed about 6' North of γ 's center.

Difference of Right Ascension between the γ 's Limb and \ast 's.

Time per clock.			
1769 Sept. 8—15	γ 's limb passed the wires vertical to the equator.	16 Pisces passed the same vertical wires.	
19 45 7—			} Cloudy
19—			
31			
42½			
45 54			} The \ast about 18' South of the γ 's center.
19 54 17½		19 56 50	
30		56 2—	
42½		13	
53		23+	
55 5		57 34+	
			then cloudy
20 29 16½		20 30 44	} The \ast by estimation 24' South of the γ 's center.
28		30 56	
40+		31 8—	
51½		31 19	
30 3½		31 30	
34 33+		36 53+	
45+		36 5	
58—		16+	
35 9		27	
35 20½		36 38+	
41 13+		- - -	} In these the γ 's center and \ast nearly at the distance of the field of the telescope, or as near the ends of the wires as the γ 's limbs would admit of.
25½		42 33	
38—		44+	
48½		55+	
42 0½		43 7—	
46 16+		- - -	
28+		- - -	
40	20 47 41		
51½	47 52		
47 3½	48 3½		
50 57—	51 49		
51 8	52 0		
51 20½	52 12		
56 39	57 23		
56 50+	57 33½		
57 1½	57 45+		

Note. In all these observations the \ast was often tried if it would keep the wire parallel to the equator, after moving it off the wire, and bringing it on again (by means of the vertical screw). For in these observations I was obliged to bring the star more Southward after I had made it keep the wire, before I brought it back for the γ ; otherwise the γ 's center would not follow through the field of the telescope; and I always found that it returned again to keep the wire with great accuracy: the wires very seldom wanting any alteration.

The \ast by estimation 24' South of the γ 's center.

In these the γ 's center and \ast nearly at the distance of the field of the telescope, or as near the ends of the wires as the γ 's limbs would admit of.

Difference of Right Ascension between the D's Limb and *'s.

Time per Clock.			
Sept.	D's 2d limb passed the wires vertical to the equator.	16 Pices passed the same vertical wires.	
h	'	h	'
21	4 14+	The * would not follow through the field of the telescope.	
	26—		
	38		
	49		
	5 1		
20	24 34	20	26 13
	24 47+		26 25½
	24 59½		37—
	25 12—		26 49
20	31 54—	20	33 12½
	32 6		24—
	32 18½		33 36
	37 27—		38 31—
	37 38½		42½
	57 51½		38 54+
10	42 51—		—
	43 4		43 53
	17		44 5½
	29—		17
	43 41—		44 5+
20	50 55—		51 23½
	51 7½		51 35½
	58 29		58 37
	58 42		58 50
	58 56+		59 3
	59 8		59 14½
20	59 21	10	59 26
21	1 —	the * 2" after the D's limb.	
21	2		
		The D's limb and * equal in A. R. as near as could be judged.	
21	3 35	The D followed the * 15" in time.	
21	7 50	Clouds	
21	11	Clear	

These may not be so accurate as the above.

The Star was to move along the equatorial wire in all these observations, and I look upon the whole to be very good; particularly those after the occultation, as the difference of declination of the D's center and Star was by estimation not more than 4 or 5', nor even so much at the last observations.

Time per Clock.			
Sept.	16 Pices passed the wires vertical to the equator.	D's 2d limb passed the same wires.	
h	'	h	'
22	23 41	22	27 14
	54		27+
	24 6+		40+
	17+		52
	24 29½		28 4+
	30 47		34 40
	31 1—		53
	13		35 6+
	25		18
	31 37		35 30+
	43 19½		47 42
	33+		54½
	44		48 6½
22	43 56	22	48 19+
22	51 32+	22	56 15—
	45½		28
	58		41—
	52 9+		52½
	52 21½		57 5+
23	2 56—	23	8 7—
	3 9—		20
	22+		32
	33+		44½
	3 45+		8 57
	15 16—		20 55
	29		21 9—

Difference of Right Ascension between the δ 's Limb and \ast 's.

		Time per Clock.					
Sept.	16 Pifces passed the wires vertical to the equator.				δ 's 2d limb pas- sed the same wires.		
	h	'	"		h	'	"
δ —20	23	15	41 +		23	21	12 +
			41 +				33
	16		+		21		46 —
	48	4			54	58 $\frac{1}{2}$	
		16 +					
		29 +			55	25	
						37 —	
	23	48	53		23	55	48 $\frac{1}{2}$
	0	3	16		0	10	44 $\frac{1}{2}$
			28 +			10	58
			41			11	11
		3	53 —			11	23
					0	11	35
	cloudy						
	δ 's 2d limb pas- sed the wires vert. to the equator.				h Leonis passed the same vertical wires.		
δ —25	2	52	2		2	54	53
			15 $\frac{1}{2}$				
			28 —		55	16 $\frac{1}{2}$	
			39 —		55	28 +	
	52	50 $\frac{1}{2}$			55	38	
	2	58	3 —		3	0	41 —
			15 $\frac{1}{2}$			0	52 $\frac{1}{2}$
			28 —			1	4 —
			39 +			1	15 $\frac{1}{2}$
	58	51 —			3	1	27 —
	3	3	54		6	18 $\frac{1}{2}$	
		4	6 $\frac{1}{2}$			30 +	
			19 —			43	
			30			52	
		4	42 $\frac{1}{2}$		7	5	
	3	15	10 —		17	12	
			22 +			24	
			34 $\frac{1}{2}$			36 +	
			45 $\frac{1}{2}$			47	
	15	57 +			17	58 $\frac{1}{2}$	

At these observations the Star followed the δ 's center along the wire parallel to the equator.

Difference of Right Ascension between the γ 's Limb and \ast 's.

Time per Clock.			
1769 Sept.	γ 's 2d limb passed the wire vertical to the equator.	h / "	γ Leonisa passed the same vertical wires.
D—25	3 21 9+	h / "	3 23 0
	22		11 $\frac{1}{2}$
	34		24
	45 $\frac{1}{2}$		34
	21 57		23 46
	27 38 $\frac{1}{2}$		29 15 $\frac{1}{2}$
	51		27
	28 3		39
	28 15		50
	3 28 26		30 1 $\frac{1}{2}$
	34 49 $\frac{1}{2}$	— — —	— — —
	35 2		36 23 $\frac{1}{2}$
	14 $\frac{1}{2}$		36 35
	25+		36 46
	35 37		36 57
	3 44 Clo.	— — —	— — —
	3 55 11	— — —	— — —
	24		3 56 6
	34		18
	47		28 $\frac{1}{2}$
	55 58		56 40
	58 29 $\frac{1}{2}$		59 6
	42+		18
	53+		29
	59 5		59 41
	Then cloudy		
	4 15		Clear
Oct.	γ passed the wires vertical to the equator.	h / "	γ 's 2d limb pas- sed the same wires.
D—16	4 9 18	h / "	4 12 10
	9 31		22+
	9 44 $\frac{1}{2}$		36
	9 55+		48
	4 10 8		4 13 0 $\frac{1}{2}$

At these observations the Star followed the γ 's center along the wire parallel to the equator.

At these observations the Star was about 4' north of the γ 's center.

Difference of Right Ascension between the D's Limb
and *'s.

Time per Clock			
1769 Oa.	* passed the wires vertical to the equator.	D's 2d limb pas- sed the same wires.	
1--16	h / "	h / "	
	4 16 40	19 51	The * 10' south of the D's center, and the * passed along the middle wire.
	16 52+	4	
	17 4	16 $\frac{1}{2}$	
	16	28	
	4 17 28	20 40 $\frac{1}{2}$	* moved along the lower wire.
	22 50	26 14	
	3	27	
	15	40	
	26	51 $\frac{1}{2}$	The * moved along the middle wire, after these I set the wires that the * passed exactly along the lower wire.
	23 38	27 4	
	29 33	23 11	
	46	24	
	58	37	The * 15' south of the D's center.
	9	59	
	30 21	34 1	
	4 54 47	21	
	59 $\frac{1}{2}$	33	
	11 $\frac{1}{2}$	46+	
	23	57	
	55 35+	5 0 10+	
	5 4 52	9 47+	
	5 4	—	
	5 15 $\frac{1}{2}$	10 11	
	5 5 27	5 10 24	
	5 12 25	5 17 37 $\frac{1}{2}$	
	38	51	
	50+	4	
	13 2	15+	
	13 14	18 27 $\frac{1}{2}$	
	5 25 46 $\frac{1}{2}$	30 26 $\frac{1}{2}$	
	25 59	39	
	26 11 $\frac{1}{2}$	51	
	26 23	31 2 $\frac{1}{2}$	
	26 35	31 16	

Difference of Right Ascensions between the D's Limb and D's.

Time per Clock.			
1769 Oct.	D's 1st limb passed the wires vertical to the equator.	D's 2d limb passed the same wires.	
D-16	h / "	h / "	
	5 38 4+	5 44 13	
	17+	26+	
	29	40—	
	41—	44 51	
23	38 53—	45 3:	Then cloudy
	D's 2d limb passed the wires vertical to the equator.	a star of 6th mag. passed the same vertical wires	
D-23	3 39 55½	3 43 16	The * about 6' north of the D's center.—The wires faintly illuminated and the * also appeared very faint.
	8—	28	
	20—	40	
	30½	50	
	40 42+	44 1	
	46 32+	49 40	The wires very indifferently illuminated, and the * still appeared faint.
	45—	49 52	
	46 57	50 6	
	47 8+	— —	
	47 20½	50 27—	
	55 3+	57 55	
	16—	58 7+	
	28—	19	
	38½	29½	
	55 50½	58 41	
	4 1 21½	4 4 1	These Numbers are a little dubious.
	4 53 9½	54 14	
	20+	25	
	53 32½	54 36—	
	5 1 41+	— —	
	1 54	2 43	clouds now began to interrupt the observations. Clear a few minutes before the D's limb, and * passed the wires at the same time: and at the D's 2d limb and * was equal in right ascension: the * by estimation 20' north of the D's center: then cloudy.
	2 6—	2 55½	
	2 16½	3 6½	
	2 30—	3 18—	
	5 32 12		

The Tranfit of Venus.

1769 June 12-3	Time per clock		
	h /		
	3 18	Rain	
	3 45	{ Viewed the ☉'s disk with the reflector (mag. 128 times), and saw nothing more than some large irregular black spots, with a black streak very near the edge of the ☉'s limb on the Eastern side.	
		Adjustment of the nonius on the side of the telescope, for distinct vision for the contacts	In. Ten. Non. Mag. o 35 15 128 } times
		Ditto for the micrometer	o 30 5 62 }
		Ditto for the wire eye glass	o 25 23 }
The air not quite clear { Ditto more dense {	10 30	Cloudy	
	11 17 53	The external contact of Venus and the Sun's limb.	
	35 30	The contact seemed to be formed by judging by their peripheries.	
	36 8	Internal contact, the thread of light broke out.	
		In. Ten. Non.	
		o 1 16	to the right-hand of ☉ } Venus's (horiz.) diameter. Those made to the left hand are set down where the nonius coincided, the compliment of which to 25 must be used.
		o 1 8	
		o 1 13	
		o 1 6	
			left
	12 12	Cloudy	
		4 o 20	} The ☉'s horizontal diameter, hazy.
		4 o 20	
		1 00 ::	
	12 21	Cloudy	
		o 1 7	to the left-hand of ☉ } Venus's diameter.
		1 14	
		1 10	
			left-hand
		After these, I immediately extended the glasses again for the Sun's diameter, but was prevented by clouds from doing any thing farther.	
	12 45	Cloudy	
	50	Ditto	

Eclipses of Jupiter's Satellites, Occultations of the ν with the fixed \star 's, and other Phænomena.

1769	Time per clock			Apparent Time			
	h	'	"	h	'	"	
April 5	1	33	12	13	49	36	Immersion 1st satellite of Jupiter.
June 3	11	17	53	6	41	13	External contact of Venus's and the Sun's limb.
	11	36	8	6	59	25	Internal ditto, the thread of light broke out.
	22	49	28	18	11	1	The eclipse of the Sun began.
July 1	15	43	34	9	20	52	Emerfion 1st satellite of Jupiter. { Twilight very strong, yet the satellites appeared well.
	21	20	19	12	42	16	Immerf. \times into the ν 's enlightened limb.
	21	33	27	13	56	18	Emerf. of ditto from the ν 's dark limb.
Sept. 20	21	17	35	10	16	20	Immerf. of 1st \times 8 into ν 's light limb.
	21	48	54	10	47	35	Emerf. of ditto from ν 's dark limb.
	21	57	7	10	55	46,6	Em. of 2d \times 8 from ν 's dark L. dubious to 3 or 4".
Sept. 25	4	26	15	17	8	2	{ Immerf. of h Ω into the ν 's light limb. { Twilight pretty strong, but not to render the observation in the least dubious.
Oct. 16	3	50	46	15	23	33	{ Emerf. of δ γ from the ν 's dark L. { Immediately after, a very thin flying cloud passed over the ν ; but I believe no part of it obstructed the observation.
Nov. 9	23	35	30	9	44	42	{ 19 \times immersed into the ν 's dark limb. The second is true to a second, but which of these minutes is true, was rendered dubious by accident.
	or	23	36	or	9	45	
Nov. 21	5	56	40	15	19	50	The \star Ω seemingly emerged from the ν 's dark limb, but rendered a little dubious by flying hazy clouds.

Observations of the \odot , \uparrow , and \ast 's passing the Meridian, made with a Transit Instrument, the length of the Telescope 4 feet, having 2 Object Glasses, and magnifying 50 times.

- 1769
Sept.
21— The transit instrument, sent by the Royal Society, was brought to Cavan.
25— Began to set up the said instrument.
29— Examined the line of collimation of the transit instrument, and found it very much out.
30— Brought it very near, and found the level very good.
Oct.
1— Brought the line of collimation quite exact (by many trials), using a distant object at the distance of about two miles.
2— At noon cloudy; in the evening it began to clear.

January 1, 1750, the mean A.R. of the Pole \ast = 10 42 37
Annual precess. 158" then the precess. to this time = + 52 00
Aberration in A.R. + 8 34
Nutation in A. R. + 1 30

Appt. A. R. the 2d of October 1769.

Clock too slow for sidereal time by the observations }
of α Cygni made on the 30th of Sept. }

Clock loses in the interval of time between α }
Cygni's passing the meridian and pole \ast }

h ' "
11 44 41 0 46 59
— 56 27
— 0 4

Pole \ast transits the meridian, October 2d, at

23 50 28 by the clock.

At this instant of time shewn per clock, I brought the middle wire to bisect the Pole \ast , and after took the passage of the following \ast 's over the meridian.

1st wire	2d wire	Time per clock of passing the meridian.	4th wire	5th wire
'	"	h ' "		
		3 26 10 +		Aldebaran
		4 6 54 $\frac{1}{2}$		Rigel
		4 46 7		α Orion
		5 38 24 —		Syrius

Note, Just before I brought the wire to the pole \ast , I set the axis of the transit instrument horizontal by the level; and at 3^h 52', I examined it again by the level, and found it very exact. In the morning I placed a mark in the meridian about $\frac{1}{2}$ of a mile North, and took particular notice what natural marks the middle wire cut on the summits of two hills, the one North about two miles, and the other South at a greater distance; these served after as complete marks in the meridian: and few meridians there are, I believe, of such a length. At first, before I could depend upon the instrument's keeping its direction all night; I sent a man to place a candle in the center of the mark placed in the meridian, and it was very seldom that I found it vary in the least: what small difference might sometimes appear, was more probably owing to the placing of the candle, than the movement of the instrument.

Observations made with the Transit Instrument.

1769	1st wire	2d wire	Time per clock of passing the me- ridian.	4th wire	5th wire	
Oct.	"	"	"	"	"	
2-3	14	25 0 58	3 25 46½ 4 45 43 5 38 00	26 32 46 28 45+	27 18 12+ 39 31::	Aldebaran α Orion Syrius
8-4	Clouds	Clouds	11 43 13:: 11 46 23	3 26 10	47 51+ 26 56+ 37 50½ 8½	☉'s 1st limb ☉'s 2d limb Aldebaran Rigel α Orion Syrius.
24-5	15+ Clouds 42½	0 Clouds 29	18 37 45½ Clouds 5 37 15½	38 30 45 44 1	15+ 28½ 38 47½	γ Aquilæ α Orion Syrius
2-6	53 7 35 19	53 38 51 5	23 49 12 3 24 40 4 5 23 4 44 36+ 5 36 52- 6 29 5½	25½ 8 21 38 29 50	Clouds 52+: 46 5+ 24 34+	Pole *, above the Pole Aldeb. Rigel α Orion Syrius Procyon
8-10	22½ 38 37 — Clouds	7+ 22- 22 35	12 3 57 6 7 18 35 53 18 40 7- 20 23 22- 20 27 51 33 15 3 23 10½	6 51+ — 51 24 7½ 28 37 34 0- 57-	36½ 22½ 41 36 24 54 29 23½ Clouds	☉'s 1st limb ☉'s 2d limb γ Aquilæ α Aquilæ ☉'s 1st limb γ Capricorn 1st C. ditto Aldeb.
8-11	28 44½	2 46+ 59½ 14 29½	4 3 32- 4 42 45- 5 35 1- 6 27 14½	4 16+ 29 35 46½ 58½	— 14- 33 43	Rigel α Orion Syrius Procyon
24-12	3 1½ Clouds	9 50½ 3 47-	12 10 35 12 46- 22 4 33 4 3 10- 42 23-	13 30 5 18+ 54+ 7+	14 15 3+ 39½ 43 52-	☉'s 1st limb ☉'s 2d limb ☉'s 1st limb Rigel α Orion

Tried the line of collimation and the horizontal position of the axis, and found both correct.

Observations made with the Transit Instrument.

	1st wire	2d wire	Time per clock of passing the meridian.	4th wire	5th wire	
1769						
Oct.						
♀—13	55 42 17½ 31 + 45 1½	38 14 + 5 28— 2½ 16—	18 38 59½ 22 57 14— 4 2 48— 42 1— 5 34 17½ 6 26 31 +	39 44½ 57 59 3 32 45 3½ 15½	29— 58 44 + 4 17 30— 50 —	* Aquilæ D's 1st limb Rigel α Orion Syrius Procyon
h—14	52½	51 39	12 19 27 + 23 52 26—	20 11½ 53 11 +	20 56 53 58—	⊙'s 2d limb Very windy. D's 1st limb Then cloudy.
⊙—15	19 6 + 45—	19 52— 29 +	12 20 37 + 22 47 18 38 15— 41 47	— 23 31½ 38 59	— 24 16 + 39 44	⊙'s 1st limb ⊙'s 2d limb } windy. α Aquilæ ξ Ditto.
D—16	28— 36 22 24 +	12½ 7— 9—	12 23 58 26 9— 18 37 52 4 40 54	38 53 + 36½ 38½	27 39 39 21 23	⊙'s 1st limb ⊙'s 2d limb α Aquilæ α Orion
♂—19	47 14½	35 32 59— 7 + 2 59 48 00½ 13 + 16 9 37 +	12 36 17½ 18 36 44 1 47 22½ 2 30 56 3 19 49— 4 0 33 4 39 46— 4 58 2 5 6 5 5 10 27—	37 2 + 29— 44 + 20 34½ 1 17½ 40 30 58 50— 6 52½ 11 16 +	Cloudy 13½ 32½ 21 21— 16— 38 5—	⊙'s 2d limb α Aquilæ α Ceti η Pleiadum Aldebaran Rigel α Orion η Gemini μ Ditto D's 2d limb
♀—20	35 59 0 + 11 1 22 24 6 29 10	36 44 + 45— 20 18 + 11 49 8 + Clouds	12 37 29 39 41½ 4 0 11 + 4 9 30 5 21 5 6 12 38 6 23 53 +	40 26½ 59— 10 14 + 51 13 26 + 24 38—	41 11 1 41— 59— 14 14 + 22	⊙'s 1st limb ⊙'s 2d limb Rigel γ Orion γ Gemini D's 2d limb Procyon Pollux

Observations made with the Transit Instrument.

	1st wire	2d wire	Time per clock of passing the meridian.	4th wire	5th wire	
1769 Oct.	"	"	"	"	"	
b-21	56 17+ Cl. Cl.	57 2½ Cl. -	22 57 49: : 3 19 4 Cl.	Cl. Cl. 39 45+	Cl. Cl. Cl.	γ Pegasi Aldeb. α Orion
⊙-22	- - - 21 39 - - - 4 35+	24 53 22 23+ - - - 5 22	18 35 38 6 23 8+ - - - 8 6 8½ 8 51 57+	36 23- 53- 6 28 57- 6 54½ 52 42½	7+ 24 37 28 47: 7 41 28	α Aquilæ Procyon Pollux ♄'s 2d Limb Regulus
♂-23	46 16 45+	47 1 34 30-	12 47 46½ 49 59- 18 35 15	50 44 59+	51 29+ 44+	⊙'s 1st Limb ⊙'s 2d Limb α Aquilæ
♂-24	54½ 10 30½ 49 40+ 46 23	39 30½ 18+ 26 47 8	6 22 24 6 26 21+ 7 12 5 8 51 12- 9 47 54	8 11½ 12 52 57 48 39	13 39 42½ Clouds	Procyon Pollux Saturn's center Regulus ♄'s 2d Limb
♂-25	53 10+ 33 00	55+ 45-	12 54 41½ Clouds 18 34 30- 10 Examined the line of collimation, and axis with the level, and found both very good.	Cl. 14+	57 39+ 59- α Aquilæ	⊙'s 1st Limb ⊙'s 2d Limb α Aquilæ
24-26	15 38½	25-	3 17 11½	17 57	43½	Aldeb. } From this time to the fourth of November cloudy, and rain.
Nov. b-4	10 40 16	29 12+ 11 28½ 30 0½	13 29 59 32 14- 18 12 17+ 18 30 46-	32 59½ 13 7 30½	45½ 14 54 32 15	⊙'s 1st Limb ⊙'s 2d Limb ♄'s 1st Limb α Aquilæ
Great rains in the night.						

Observations

Observations made with the Transit Instrument.

	1st wire		2d wire		Time per clock of passing the meridian.		4th wire	5th wire	
	' "	' "	' "	' "	h ' "	' "	' "	' "	
1769 Nov. ○ — 5			35 4		13 35 50½		36 36½	Cl.	○'s 2d limb
			38½		18 30 24—		8½	53	α Aquilæ
			58 8		18 58 54½		59 40		2β Capricorn
	0 42		1 29+		19 2 17+		3 4½	3 52	δ's 1st limb
					19 13 20—		14 6—		Nº. 439 zodiac, de la Caille
					19 18 25½				Telescopic star a little N. of the fore-
					19 31 3		31 47½		μ Aquarii [going one.
	Cloudy all the morning part.								
8 — 8	Tried the line of collimation, and the horizontal position of the axis, and found both exact.								
					11 46 48		47 32+	48 16½	Venus's center
4 — 9	46 37—		23		13 48 10				○'s 1st limb
					50 26		51 12+	58½	○'s 2d limb
		28 10			18 28 55½		29 40	24½	α Aquilæ
	7 17—	8 1½			20 8 46+		31—	15+	β Aquarii
	20 44	21 29—			20 22 14		58½	23 43+	ε Pegasi
					22 17 27				γ Piscium
	18 29+	19 15			22 20 0½		20 46	21 31	δ's 1st limb
		23 13			22 23 58—		24 42		19 Piscium
9 — 10	50 17	51 4			13 51 51				○'s 1st limb
					54 7		53½	40—	○'s 2d limb
	4—	48+			18 28 34—		18	3—	α Aquilæ
	40 46—	41 31½			21 42 17½		3—	43 48+	α Pegasi
	11 28—	12 13½			23 13 0—		46—	14 31+	δ's 1st limb
	52½	51 37½			3 52 23—		7—	53 52—	Rigel
	0 12+	0 56½			4 1 41		2 26—	10	γ Orion
	6½	51—			4 31 36		32 20+	33 5	α Orion
h — 11	42—	26+			18 28 12—		56+	41—	α Aquilæ
○ — 12	40 50½	41 39+			0 42 28—		15+	44 3—	α Arietis
	8 15+	9 3			1 9 51½		10 39—	11 26+	δ's 1st limb
		13½			2 22 2		22 50		η Pleiadum
	9 22	10 8			3 10 55—		40	27—	Aldeb.

Observations made with the Transit Instrument

	1st wire	2d wire	Time per clock of passing the meridian.	4th wire	5th wire	
1769						
Nov.	" "	" "	" "	" "	" "	
8-14	8 13 25 36 Clouds 39 22 36	8 13 21 Clouds 25 23 25½	14 9 00 18 27 6 Clouds 3 10 12 3 15 55 3 24 15+	Clouds 51 Clouds 10 57+ 42½ 25 5	10 33 35 0 43 20 11 43+ 25 54	☉'s 2d limb α Aquilæ α Arietis Aldebaran γ Tauri δ 2d limb.
8-15	8 53+	9 40	14 10 27+ 12 45	13 31+	14 18	☉'s 1st limb ☉'s 2d limb.
24-16	54½ 54½ 9 32½	40 12 40½ 39 10 19	14 16 31 0 41 00 3 9 27 4 29 24 5 11 5+	17 17 41 48 13 8+ 11 51	4 42 36 10 59 53 37½	☉'s 2d limb α Arietis Aldebaran α Orion γ Gemino δ's 2d limb
<p>36 24-37 13:: 5 38 1+ 38 50 39 39- The position of the instrument in the morning was about a second (in the equator) too much Eastward for Stars to the South of the Zenith.</p>						* Occasioned by a fluttering more than common.
8-17	7 33½ 12 2½ 38 31+	39 50+ 19 47 39 19+	0 40 38+ 3 9 6 6 13 32 6 40 7+	26+ 51½ 14 16 40 54½	42 14 37½ Clouds 41 42½	α Arietis Aldebaran Procyon δ's 2d limb.
8-21	37 33 6 4 10 1½	38 21 6 50 48 10 47	0 39 9 3 7 36+ 4 27 33 10 11 33	57 22 17½ 10 4 0½ 12 17½	44½ 8 2½ 4 45 13 3	α Arietis Aldebaran α Orion ε ♈ δ's 2d limb.
8-22	58 10 Clouds	58 56 Cloudy	10 59 42 Clouds	0 27+ 12 50 17	1 13+ 12 51 4	δ's 2d limb Arcturus.
24-23	2 ½ 22 17	40 9 28 1½	14 40 57 43 16 18 23 47	44 44 3 31+	50+ 16+	☉'s 1st limb ☉'s 2d limb α Aquilæ.

Observations made with the Transit Instrument.

1769	1st wire	2d wire	Time per clock of passing the meridian.	4th wire	5th wire	
Nov.	' "	h "	h ' "	' "	' "	
♀ — 24			12 48 45½	49 32½	50 20—	Arcturus.
♂ — 27	} Packing up the Instruments. { Tried the line of collimation, and found it good.					
♂ — 28						
Dec. 7	Sent off the Instruments for Dublin.					

Charles Mafon.